

REMARKS

This is in full and timely response to the Office Action dated May 2, 2006. The Examiner is respectfully requested to reconsider and withdraw the rejections made in the last Office Action based on the above amendments and the following remarks.

By this Amendment, claims 4, 8, 14, 15, 17 and 18 have been cancelled, and claims 1, 5, 9 and 16 have been amended. Claims 1 to 3, 5 to 7, 9 to 13, and 16 remain pending for the Examiner's reconsideration.

Specification

Various amendments have been made to the specification to correct minor informalities, including reference numeral corrections and grammatical corrections. No new matter has been added by these amendments.

Rejection of Claims 1 to 18 Based on Braun et al.

Claims 1 to 18 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Braun et al. (U.S. Patent No. 4,595,839). The Examiner contends that Braun et al. discloses all of the features of the claimed invention, and refers specifically to Figs. 1 to 3 of Braun et al. for a teaching of the claimed features. To the extent that this rejection might still be applied to the remaining claims 1 to 3, 5 to 7, 9 to 13 and 16 as amended, it is respectfully traversed for the following reasons.

Braun et al. discloses a bidirectional optical electronic converting connector that converts electrical signals into optical signals for transmission along an optic fiber, and that converts optical signals into electric signals for transmission through the connector. The connectors can be provided at each end of a cable to provide an interconnecting cable assembly that receives electrical signals from a sending apparatus at either end of the cable, and presents electrical signals to a receiving apparatus at the other end of the cable, with the transmission along the cable being optical. The cable of Braun et al. has some relevance to the Applicants' invention because both transmit optical signals along the length of the cable, but convert the optical signals into electrical signals for transmission through the connectors at the ends of the cable.

However, the connector assembly of Braun et al. is substantially different from the Applicants' claimed invention. Specifically, in the connector assembly of Braun et al., the optical signals transmitted through the optic fiber 13d, 13e are converted into electrical signals by the circuitry shown in Fig. 11. The electrical signals are in the form of "DATA OUT" pulses 82, which are presented at a terminal 63 to the electrical pin subassembly 18 for transmission through the connector to the receiving apparatus. As seen in the circuit of Fig. 11 of Braun et al., the terminal 63 is not part of, nor connected to, a power transmission line through the connector assembly. Instead, the terminal 63 is apparently connected to one of the several pin connectors in the subassembly 18 via a wiring device 21c for transmitting the pulses 82 through the connector to a corresponding terminal and circuit in a receiving connector. Braun et al. does not teach or suggest a system in which electrical data signals from an optical/electrical converter are fed into a power line for transmission through an electro-optical composite connector.

In contrast, the Applicants' invention provides an electro-optical composite connector for use with a cable incorporating both a power line and an optical fiber. The connector includes a plug 110 with a power connecting device 112 and a first optical/electrical signal converter 113, and a receptacle 121 with a second optical/electrical signal converter 123 and a receiver 122 for receiving and releasing the power connecting device 112. The signal converters 113, 123 in the plug 110 and the receptacle 120 convert the optical signals from the optical fiber 132, 142 to an electric signal and transmits it to the opposing receptacle 120 or plug 110 through the power connecting metal 112 and the receiver 122. The opposing receptacle 120 or plug 110 converts the electric signal back to an optical signal and transmits it to the optical fiber 142, 132.

Because the electric signal in the Applicants' invention is transmitted using the power connecting metal 112 and the receiver 122 (instead of a separate conductor as in Braun et al.), the structure can be simplified and the cost can be reduced. Further, because a portion using the electric signal is very short, deterioration of information and drop in transmission velocity can be minimized.

To further emphasize these differences, the Applicants' claims have been amended to clarify that the electric signals transmitted between the first and second signal converters 113, 123 are transmitted into and through the power lines 131, 141. In other words, the electric signals from the first and second signal converters 113, 123 flow into a conductive material connected to the power lines 131, 141 so that additional pin connectors are not necessary to transmit the electric signals across the connector. Specifically, claim 1 has been amended to recite:

an electro-optical composite plug having a power connecting device
comprising a conductive material that connects the first power line to supply power,

and a first signal converter for converting an optical signal transmitted through the first optical fiber to an electric signal flowing into the conductive material of the second power connecting device line and for converting an electric signal transmitted through the conductive material of the second power connecting device line to an optical signal flowing into the first optical fiber; and

an electro-optical composite receptacle having a receiver comprising a conductive material that connects to the second power line for receiving and releasing said conductive material of the power connecting device of the electro-optical composite plug for transmitting power between the first and second power lines, and a second signal converter for converting an optical signal transmitted through the second optical fiber to an electric signal flowing into the conductive material of the receiver first power line and for converting an electric signal transmitted through the conductive material of the receiver first power line to an optical signal flowing into the second optical fiber.

Similar changes were made by this amendment to independent claims 5 and 9. Independent claim 16 has also been amended to further emphasize the differences between the Applicants' invention and the prior art as follows:

an electro-optical composite plug having a power connecting device that electrically connects the first power line to supply power, and a first signal converter for converting an optical signal transmitted through the first optical fiber to an electrical a-second signal which is transmitted into the first power line and for converting an electrical the-second signal transmitted through the first power line a selected path to an optical a signal in the first optical fiber; and

an electro-optical composite receptacle having a receiver for receiving and releasing said power connecting device for electrically connecting the first and second power lines, and a second signal converter for converting an optical signal transmitted through the second optical fiber to an a-second electrical signal which is transmitted into the second power line and for converting an electric signal transmitted through the second power line a-selected medium to an optical signal in into the second optical fiber.

Support for the amendments to claims 1, 5, 9 and 16 can be found in the Applicants' specification, for example, on page 17, lines 7 to 28, and in Fig. 3 of the drawings.

As amended, these claims are believed to clearly distinguish the Applicants' invention over the teachings of Braun et al. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1 to 3, 5 to 7, 9 to 13 and 16 as being anticipated by Braun et al.

Rejection of Claims 4, 8, 14 to 16 and 18 Based on Plummer et al.

Claims 4, 8, 14 to 16 and 18 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Plummer et al. (U.S. Patent No. 4,925,267). Claims 4, 8, 14, 15 and 18 have been cancelled by this amendment. To the extent that this rejection might still be applied to amended claim 16, it is respectfully traversed for the following reasons.

Plummer et al. discloses a structure for connecting optical fibers in which optical signals are transmitted from one optical fiber to another using an arrangement of lenses 52. Plummer et al. does not teach or suggest the use of a signal converter for converting optical signals into electrical signals for transmission across a connector. As such, Plummer et al. clearly does not disclose an arrangement in which converted optical-to-electric signals are fed into a power line for transmission across an electro-optical composite connector.

Accordingly, the Examiner is respectfully requested to reconsider and withdrawn the rejection of claim 16 as being anticipated by Plummer et al.

Conclusion

For at least these reasons, it is respectfully submitted that the Applicants' claimed invention, as presented in the amended claims herein, is not anticipated by the prior art teachings of Braun et al. and Plummer et al. Accordingly, the Applicants respectfully submit that all of the pending claims 1 to 3, 5 to 7, 9 to 13 and 16 are now in condition for allowance, and request that a timely Notice of Allowance be issued for this application.

If the Examiner has any comments or suggestions that could place this application into even better form, the Examiner is encouraged to contact the Applicants' undersigned representative at the telephone number listed below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. SON-2978 from which the undersigned is authorized to draw.

Dated: July 31, 2006

Respectfully submitted,

By 

Ronald P. Kananen

Registration No.: 24,104

RADER, FISHMAN & GRAUER PLLC

Correspondence Customer Number: 23353

Attorney for Applicant

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Reply to Office Action of May 2, 2006

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APPENDIX

- (1) Marked-up Version of Substitute Specification; and
- (2) Cleaned Version of Substitute Specification